

**GUIDANCE ON  
CONDUCTING  
REASONABLE  
ASSURANCE ANALYSIS**

Los Angeles  
County MS4  
Permit  
TAC Meeting  
August 27,  
2013



**OBJECTIVES OF  
REASONABLE  
ASSURANCE ANALYSIS**

# OVERARCHING PURPOSE

- USEPA: Need to have adequate demonstration that, “...where a *BMP-based approach to permit limitations is selected, the BMPs required by the permit will be sufficient to implement applicable WLAs.*” (USEPA 2010)
- Regional Board: “*Permittees shall conduct a Reasonable Assurance Analysis for each water body-pollutant combination addressed by the Watershed Management Program ... The objective of the RAA shall be to demonstrate the ability of Watershed Management Programs and EWMPs to ensure that Permittees’ MS4 discharges achieve applicable water quality based effluent limitations and do not cause or contribute to exceedances of receiving water limitations.*” (Part VI.C.5.b.iv.(5), pp. 63-64)

# **SPECIFIC OBJECTIVES FOR RAA GUIDANCE**

- **Ensure appropriate and robust analysis**
- **Provide clear direction to WMP/EWMP groups and their consultants regarding requirements/expectations**
- **Promote consistency among WMP/EWMP groups**
- **Facilitate agency and public review of draft WMPs/EWMPs**

# TECHNICAL OBJECTIVES OF RAA GUIDANCE

## MODELING

- Identify required scope of RAA
- Identify acceptable models for RAA
- Establish simulation time period(s)
- Establish standardized criteria for model input
- Establish standardized model output requirements
- Establish standardized criteria for sensitivity analysis

## SELECTED WATERSHED CONTROL MEASURES

- Identify acceptable BMP performance databases/literature for model input
- Identify acceptable statistical thresholds for BMP performance for model input
- Identify key hydrologic and physiographic parameters that impact BMP performance and ensure that these parameters are accurately represented in the model
- Identify O&M practices that impact BMP performance and ensure that model assumptions are carried out in Permittees' O&M procedures



**SPECIFIC PERMIT  
REQUIREMENTS  
RELATED TO RAA**

# RAA PERMIT REQUIREMENTS (PART VI.C.5.b.iv.(5), pp.63-64)

- Quantitative
- Performed using peer-review model(s) in the public domain
  - Watershed Management Modeling System (WMMS)
  - Structural BMP Prioritization and Analysis Tool (SBPAT)
  - Hydrologic Simulation Program-FORTRAN (HSPF)\*
  - Others? (e.g., SUSTAIN)
- Includes all available, relevant subwatershed data collected within the last 10 years that meets QA/QC criteria for use in RAA
  - land use
  - pollutant loading
- BMP performance data from peer-reviewed sources
- Use of best statistical estimate of BMP performance for the pollutants to be addressed

# REQUIRED SCOPE OF RAA

## ■ WATER BODY-POLLUTANT COMBINATIONS

### ■ Category 1

- Analysis of water body-pollutant combinations with interim or final TMDL compliance deadlines during the permit term (through December 28, 2017)\*
- Analysis of water body-pollutant combinations with TMDL compliance deadlines beyond the permit term (after December 28, 2017) [based on proposed interim milestones to ensure progress during permit term]

### ■ Categories 2 & 3 (Part VI.C.5.a.ii, p. 59)

- Analysis of water body-pollutant combinations not addressed by TMDLs [to ensure progress to controlling MS4 discharges within a timeframe that is as short as possible such that they do not cause or contribute to exceedance(s) of RWLs]

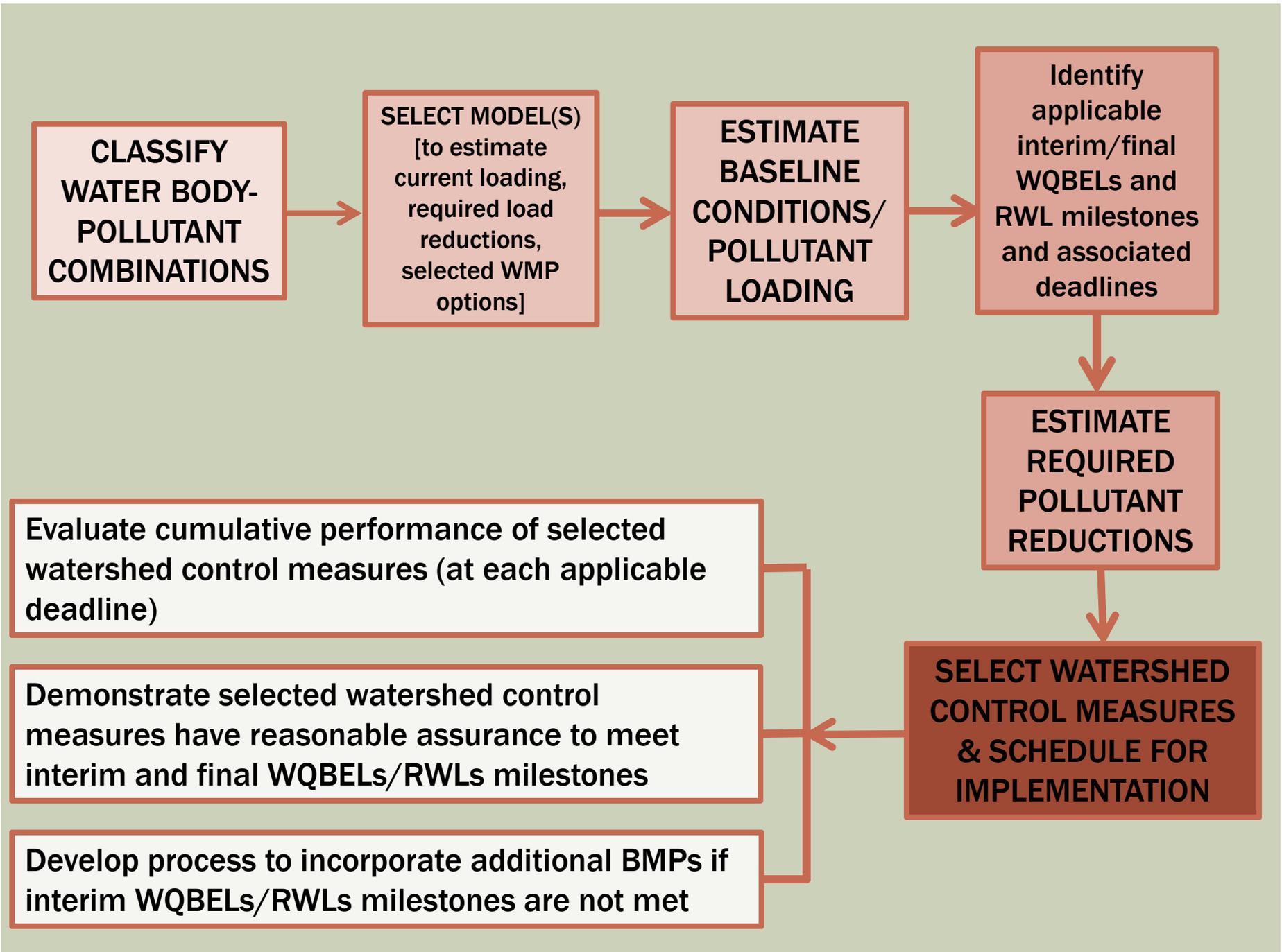
# STEPS IN RAA

- **Permittees shall classify and list water body-pollutant combinations into one of the following three categories:**
  - **Category 1: Water body-pollutant combinations subject to a TMDL**
  - **Category 2: Water body-pollutant combinations identified on the 303(d) List**
  - **Category 3: Water body-pollutant combinations with exceedances of receiving water limitations**

# STEPS IN RAA (CONT.)

## QUANTIFY

- Current/baseline pollutant loading and runoff volume from MS4
- Allowable MS4 pollutant loading (allocation/WQBEL)
- Required pollutant reduction to attain applicable interim/final WQBEL(s)
- Pollutant removal/effectiveness for individual watershed control measures selected for implementation
- The full suite of watershed control measures to be implemented to attain applicable WQBELs/milestones
- The water quality outcomes associated with implementation of the full suite of watershed control measures, above
  - That is, the cumulative effectiveness of the watershed control measures implemented in the subwatershed area



**CLASSIFY  
WATER BODY-  
POLLUTANT  
COMBINATIONS**

**SELECT MODEL(S)**  
[to estimate  
current loading,  
required load  
reductions,  
selected WMP  
options]

**ESTIMATE  
BASELINE  
CONDITIONS/  
POLLUTANT  
LOADING**

**Identify  
applicable  
interim/final  
WQBELs and  
RWL milestones  
and associated  
deadlines**

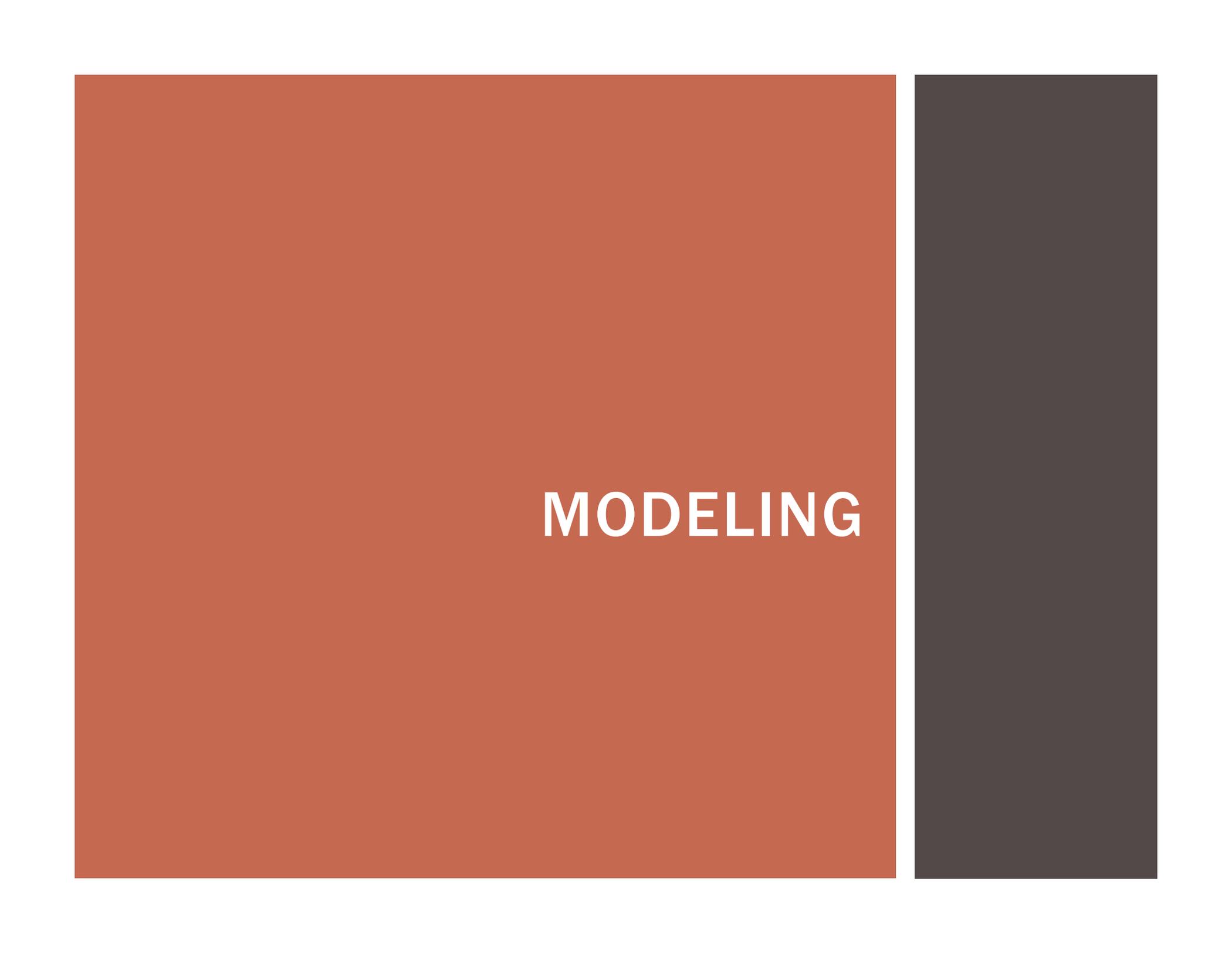
**ESTIMATE  
REQUIRED  
POLLUTANT  
REDUCTIONS**

**SELECT WATERSHED  
CONTROL MEASURES  
& SCHEDULE FOR  
IMPLEMENTATION**

**Evaluate cumulative performance of selected watershed control measures (at each applicable deadline)**

**Demonstrate selected watershed control measures have reasonable assurance to meet interim and final WQBELs/RWLs milestones**

**Develop process to incorporate additional BMPs if interim WQBELs/RWLs milestones are not met**



**MODELING**

# EXPECTED MODEL CAPABILITIES

- Dynamic continuous long-term simulation for modeling runoff and pollutant loadings and concentrations in discharges and receiving waters from lands in a watershed system
- Can represent rainfall, runoff, and groundwater processes of urban and natural watershed systems
- Can represent variability in pollutant loadings, based on land use, soil hydrologic group, and slope among other parameters
- Employs a BMP process based approach or empirically based BMP approach
- Includes decision support to evaluate cumulative BMP performance on a watershed scale

MODEL TYPE	MODEL NAME
E.1 Land/Watershed Models	
	HSPF, LSPC, SWMM, SWAT, WARMF
E.2 Receiving Water Models	
	HSPF, LSPC, SWMM, EFDC, CE-QUAL-ICM/TOXI, QUAL2K, WASP
E.3 BMP Performance Models	
* Process based models	SWMM BMP module BASINS BMP module EPA TMDL Modeling Toolbox
* Empirically based models	International Stormwater BMP Database
E.4 Integrated BMP Modeling Systems	
* Process based models	EPA SUSTAIN model Los Angeles County WMMS model
* Empirically based models	City of Los Angeles SBPAT model

**AVAILABLE PUBLIC DOMAIN MODELS FOR RAA**

Models in E.1 - E.3 must be used in combination

Models in E.4 may be used as single, integrated model system

# PRIMARY COMPONENTS OF MODELING REQUIREMENTS

- Model input data
- Model parameters
- BMP performance parameters
- Model output

MODEL OUTPUT	CONTENT	FORMAT
<b>5.1 Current/Baseline Pollutant Loadings and Runoff Volume</b>		
	Current pollutant loadings and runoff volume (by subwatershed)	Tables
<b>5.2 Surface Runoff Output</b>		
	Surface runoff (by subwatershed for each BMP scenario under representative conditions)	Tables
	Percent reduction (by subwatershed for each BMP scenario)	Tables
<b>5.3 Load Reduction Output</b>		
	Pollutant load reductions (by subwatershed for each BMP scenario/phase under representative conditions)	Tables
	Time series plots of pollutant load reductions for each BMP scenario at compliance points	Graphics
<b>5.4 Hydrographs and Pollutographs</b>		
	Flow hydrographs at compliance points for each BMP scenario	Graphics
	Pollutographs at compliance points (outfall and/or receiving water) for each BMP scenario	Graphics
<b>5.5 BMP Performance Summary</b>		
	Load comparison for with and without BMP and graphs for each BMP scenario/phase	Tables/Graphics
	BMP retention volume for each BMP scenario/phase	Tables/Graphics

**MODEL  
OUTPUT  
REQUIRE-  
MENTS**

MODEL TYPE /MODEL NAME	MODEL FACT SHEETS
<b>E.1 Land/Watershed Models</b>	
<b>HSPF</b>	<p>Hydrological Simulation Program-Fortran , Model Distribution Coordinator: USEPA Center for Exposure Assessment Modeling  Model is available at <a href="http://www2.epa.gov/exposure-assessment-models/surface-water-models">http://www2.epa.gov/exposure-assessment-models/surface-water-models</a></p>
<b>LSPC</b>	<p>Loading Simulation Program in C++, Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA  Model is available at <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>
<b>SWMM</b>	<p>Storm Water Management Model,  Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA, Model is available at <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>
<b>SWAT</b>	<p>Soil and Water Assessment Tool , Model Distributor Coordinator: USDA Agriculture Department, Model is available at <a href="http://swat.tamu.edu/software/">http://swat.tamu.edu/software/</a></p>
<b>WARMF</b>	<p>Watershed Analysis Risk Management Framework, Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA , Model is available at <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>

MODEL TYPE /MODEL NAME	MODEL FACT SHEETS
E.2 Receiving Water Models	
HSPF	<p>Hydrological Simulation Program-Fortran , Model Distribution Coordinator: USEPA Center for Exposure Assessment Modeling Model is available at <a href="http://www2.epa.gov/exposure-assessment-models/surface-water-models">http://www2.epa.gov/exposure-assessment-models/surface-water-models</a></p>
LSPC	<p>Loading Simulation Program in C++, Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA Model is available at <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>
SWMM	<p>Storm Water Management Model, Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA, Model is available at <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>
EFDC	<p>Environmental Fluid Dynamic Code , Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA, Model is available at <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>
CE-QUAL-ICM/TOXI	<p>A Multi-Dimensional, Water Quality Model for Surface Water Model Distribution Coordinator: US Army Corps of Engineer Environmental Laboratory, Model is available at <a href="http://el.erdc.usace.army.mil/products.cfm?Topic=model&amp;Type=watqual">http://el.erdc.usace.army.mil/products.cfm?Topic=model&amp;Type=watqual</a></p>

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E.2 Receiving Water Models	
QUAL2K	<p>River and Stream Water Quality Model ,  Model Distribution Coordinator: USEPA, Ecosystems  Research, Athens, GA      Model is available at  <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>
WASP	<p>Water Quality Analysis Simulation Program,  Model Distribution Coordinator: USEPA Ecosystems  Research, Athens, GA      Model is available at  <a href="http://www.epa.gov/athens/wwqtsc/html/lspc.html">http://www.epa.gov/athens/wwqtsc/html/lspc.html</a></p>

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E.3 BMP Performance Models	
SWMM BMP model	<p>Storm Water Management Model (SWMM) Version 5.0.022 with Low Impact Development (LID) Controls , Model Distribution Coordinator: USEPA Risk Management Research, Model is available at <a href="http://www.epa.gov/nrmrl/wswrd/wq/models/swmm/">http://www.epa.gov/nrmrl/wswrd/wq/models/swmm/</a></p>
BASINS BMP model	<p>BASINS (Better Assessment Science Integrating point &amp; Non-point Sources), Model Distribution Coordinator: USEPA Water Science Technology, Model is available at <a href="http://water.epa.gov/scitech/datait/models/basins/index.cfm">http://water.epa.gov/scitech/datait/models/basins/index.cfm</a></p>
EPA TMDL Modeling Toolbox	<p>EPA TMDL Modeling Toolbox contains BMP assessment tools, watershed models, receiving water models, Model Distribution Coordinator: USEPA Ecosystems Research, Athens, GA, Model is available at <a href="http://www.epa.gov/athens/wwqtsc/Toolbox-overview.pdf">http://www.epa.gov/athens/wwqtsc/Toolbox-overview.pdf</a></p>

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E.4 Integrated BMP Modeling Systems	
EPA SUSTAIN model	<p>System for Urban Stormwater Treatment and Analysis IntegratioN Model, Model Distribution Coordinator: USEPA Risk Management Research, Model is available at <a href="http://www.epa.gov/nrmrl/wswrd/wq/models/sustain/">http://www.epa.gov/nrmrl/wswrd/wq/models/sustain/</a></p>
Los Angeles County WMMS model	<p>The Los Angeles County Watershed Management Modeling System, Regional Optimization, Model Distribution Coordinator: Los Angeles County Flood Control District. Model is available at <a href="http://dpw.lacounty.gov/wmd/wmms/">http://dpw.lacounty.gov/wmd/wmms/</a></p>
City of Los Angeles SBPAT model	<p>Structural BMP Prioritization and Analysis Tool. Model Distribution Coordinator: City of Los Angeles and County of Los Angeles. Model is available at <a href="http://www.sbpat.net/downloads.html">http://www.sbpat.net/downloads.html</a></p>

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